

**2014 Environmental  
Assessment Update  
Hibernia Drill Centres  
Construction and Operations  
Program (2014)**



Prepared for:  
Hibernia Management and  
Development Company (HMDC)  
Suite 1000, 100 New Gower  
Street, St. John's, NL

Prepared by:  
Stantec Consulting Ltd.  
141 Kelsey Drive  
St. John's, NL A1B 0L2  
Tel: (709) 576-1458  
Fax: (709) 576-2126

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**Final Report**

May 20, 2014

**2014 ENVIRONMENTAL ASSESSMENT UPDATE**  
**HIBERNIA DRILL CENTRES CONSTRUCTION AND OPERATIONS PROGRAM (2014)**

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### 1.0 INTRODUCTION

Activity occurring at the Hibernia Oil Field in 2014 includes:

- drilling, including relocation of drill cuttings from the wellhead area outside the excavated drill centre (EDC) during riserless drilling and vertical seismic profiling (VSP);
- wellsite geohazard and engineering geophysical surveys,
- boulder definition and geotechnical surveys; and
- a fish habitat and environmental baseline survey.

Normal base business will occur as usual and an environmental effects monitoring program will be conducted this year. All activities will be conducted within the original project area (see Figure 1-1).

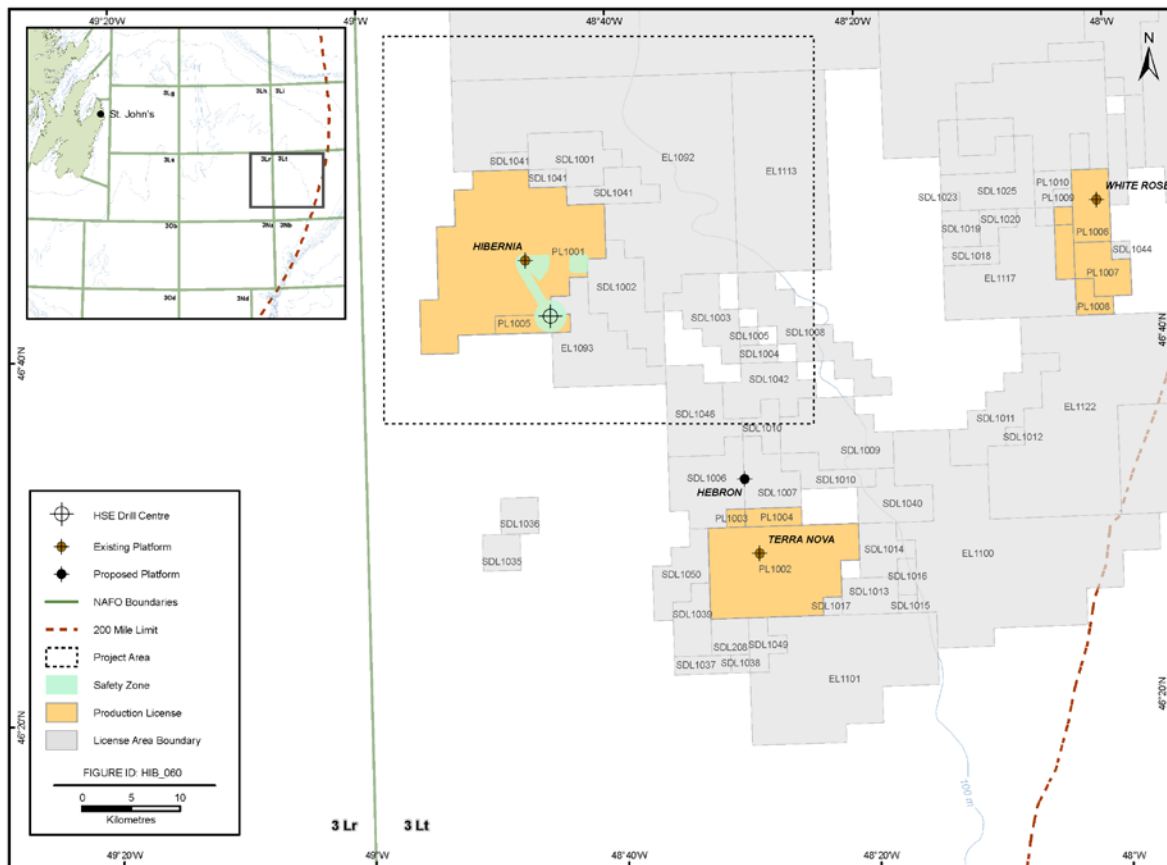


Figure 1-1 2014 Activities Project Area

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### 1.1 Background

This is an environmental assessment update for construction and operation activities proposed for 2014 and is intended to reflect an update to Sections 2.1.2 (drilling), 2.1.3 (geohazard and VSP surveys) and 2.1.4 (subsea equipment installation) of the Hibernia Drill Centres Construction and Operations Program, Hibernia Management and Development Company (HMDC) (Jacques Whitford 2009; Stantec 2011, 2013) (CEAR No. 08-01-42279). These activities were generally described in the Hibernia Drill Centres Construction and Operations Environmental Assessment (CEAR No. 08-01-42279).

In addition to updating the project description and verifying that the scope and assessment predictions of the Hibernia Drill Centres Construction and Operations Program Environmental Assessment are still accurate and valid, the information on the Valued Environmental Components (VECs) commercial fisheries and species at risk has also been updated (information current to March 24, 2014).

### 1.2 2014 Activities

The following proposed 2014 activities for the Hibernia offshore drilling and production facility were previously assessed in the 2009 environmental assessment or the original 1985 Environmental Impact Assessment or subsequent environmental assessment updates:

- Drilling, including VSP
- wellsite geohazard and engineering geophysical surveys, including boulder definition and geotechnical surveys and a fish habitat and environmental baseline survey.

Removal of cuttings from an EDC has not been previously assessed.

#### 1.2.1 Drilling

Hibernia plans to drill four water injection wells in the Hibernia Southern Extension EDC in 2014. These wells will be drilled consecutively with Seadrill's *West Aquarius* harsh environment semi-submersible. Mooring operations will involve running eight anchors and associated chain on the seabed.

Riser connected drilling will be performed using both water based and non-aqueous-based drilling fluids (NADF). Cuttings from the water-based hole section will be discharged directly overboard. Drill cuttings (Table 1.1) generated while drilling with non-aqueous drilling fluids will be processed through a cuttings dryer system to reduce synthetics-on cuttings to within dischargeable limits (6.9 mg/kg). All other effluents and waste from the *West Aquarius* will be managed as per the Hibernia Environmental Protection Plan, in particular, the *West Aquarius* Environmental Compliance Monitoring Plan. The existing HMDC drill fluids supplier will also supply fluids for the drilling program, therefore few changes are expected.

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**Table 1.1 Volume of Discharged Cuttings**

Hole Section	Discharged Cuttings Volume (m <sup>3</sup> )
1,067 mm interval (20% washout)	120
660 mm interval (20% washout)	140
444.5 mm interval (10% washout)	350

Drilling will occur year-round throughout 2014.

#### 1.2.1.1 Removal of Cuttings from Excavated Drill Centre

Removal of cuttings from the wellhead area using a sub-sea pump has not been previously assessed in either the original environmental assessment, drill centres environmental assessment (Jacques Whitford 2009) or the subsequent updates (Stantec 2011, 2013).

Cuttings created during the riserless portion of the program will be removed from the EDC using a subsea pump and hose arrangement. Previous applications of the relocation system resulted in a cuttings pile of approximately 9 m across in diameter, 1.8 to 2.4 m in thickness or width and approximately 2.4 m in height. The cuttings pile generated from the HBNA EDC is anticipated to be similar (or larger) to these dimensions. Cuttings will be removed using a subsea pump module (4,500 mm long, 1,700 mm wide, 1,500 mm high and 4,200 kg) via 40 m suction hose and an 80 m discharge hose, which starts within the EDC and extends to approximately 40 m outside the EDC (Figure 1-2). The suction/discharge hose specifications are provided in Table 1.2.

Due to operational constraints associated with the subsea pumping system, there will be two debris locations, one at the north side of the EDC and one at the south side of the EDC.

#### 1.2.1.2 Vertical Seismic Profiling

The plan for these wells includes a VSP survey and may involve remote operated vehicle surveys within the EDC. SeismicVISION, Schlumberger's seismic-while-drilling service, acquires time-depth-velocity information in real time without disrupting drilling operations. The real-time waveform resolution and sufficient length allows look-ahead VSP processing. Continuous transmission of data allows quality control, update of the target locations, and process look-ahead VSPs while drilling. The system consists of a 3.5 m downhole receiver and dual surface air source arrays coordinated through accurate synchronized clocks. Data will be acquired while tripping out of hole over both open and cased hole sections. VSP was previously assessed in the 2009 environmental assessment.

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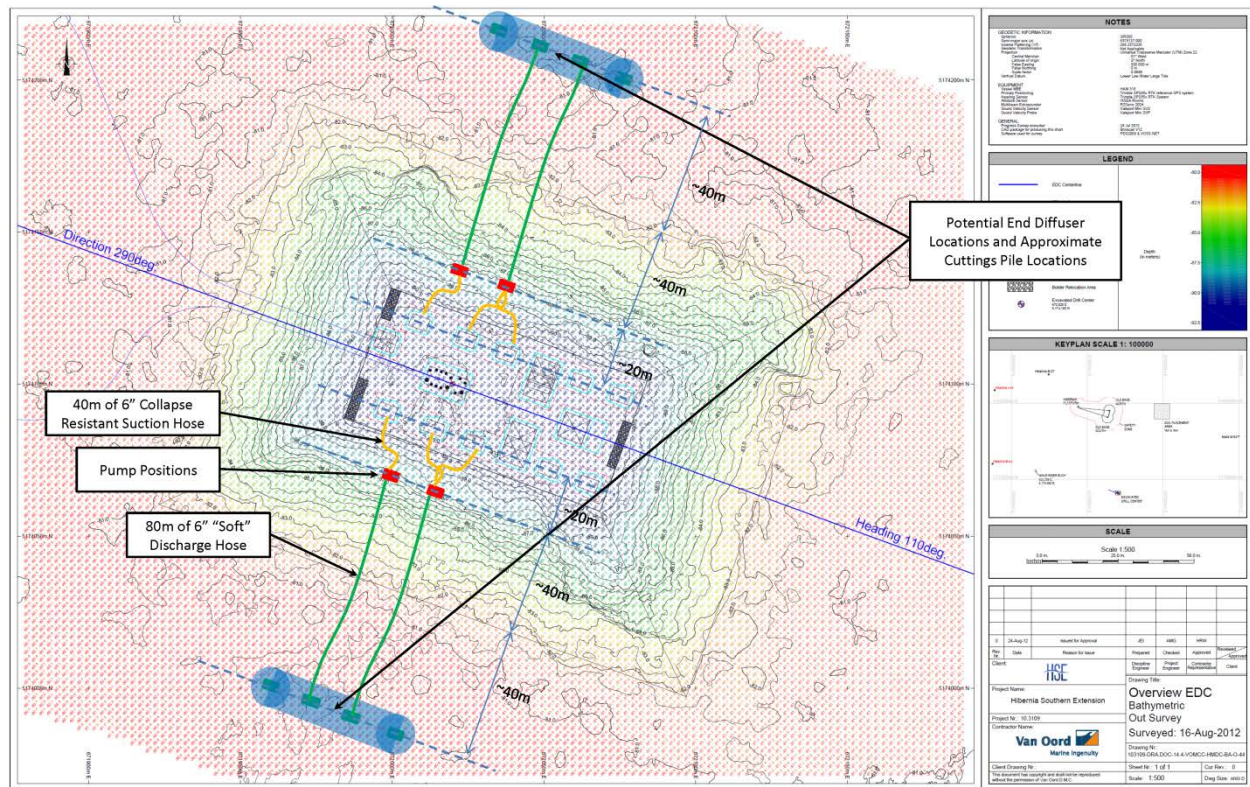


Figure 1-2 Schematic of Proposed Cuttings Removal

Table 1.2 Suction/Discharge Hose Specifications

Flow		order %	Net Analyzer I (amps)	Frequency (Hz)	Current supply 440 - (amps)	Current out HV (amps)	Calculated current (amps)	Power (KW)
gpm US	m <sup>3</sup> /minute							
200	0.76	19	40	20.3	33	34.5		61
400	1.51	21	47	21.4	35	34		91
600	2.27	22	45	22	37	34.5		82
800	3.03	27	52	24.7	47	35.5		47
1,000	3.79	34	44	28.5	64	37		104
1,200	4.54	40	36	31.8	81	39		75
1,500	5.68	44	37	34	98	40.5	111.7	85
1,700	6.44	50	44	37	120	43		128



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#### 1.2.2 Wellsite Geohazard and Engineering Geophysical Surveys

The following proposed 2014 activities (conducted along the Hibernia Ben Nevis Avalon (HBNA) route survey) for the Hibernia offshore drilling and production facility were previously assessed in the 2009 environmental assessment or the original 1985 Environmental Impact Assessment or subsequent environmental assessment updates:

- two-dimensional hi-resolution (2DHR) seismic survey infill centred over the HBNA excavated drill centre (EDC). Approximately 50 line-kilometres will be collected; if 2DHR data requires reacquisition, this could increase to 200 line-kilometres
- engineering geophysical survey over a 4.5 km x 4.5 km area centred on the HBNA EDC. Approximately 290 line-kilometres maximum will be collected (could be reduced if 2002 data resolution is sufficient for operations geology)
- engineering geophysical survey over the approximately 5 km flow line route corridor from the Hibernia Platform to the HBNA EDC
- geotechnical survey collecting approximately six grab samples (one every 1 km along the flow line route) to determine friction coefficient
- geotechnical surveys at EDC locations using an acoustic corer, ROV-mounted sub-bottom imager and wheeldrive cone penetrometer test
- sidescan sonar and magnetometer survey of the *Ocean Ranger* debris site
- multibeam echosounder bathymetry survey of Hibernia Platform cuttings pile
- fish habitat survey using towed video acquisition over various transects along the flow line route and EDC location.
- environmental effects monitoring/environmental baseline survey acquiring seabed samples with either modified box corer or day grab and water column water samples to provide pre-development environmental baseline data

Wellsite geohazard and engineering geophysical surveys will be conducted between June to November.

Equipment used for these surveys include:

- 2DHR: 160 cubic inch source, 600 to 1,200 m streamer
- Hunttec Deep Tow System (DTS) (0.5 to 15 kHz) sub-bottom profiler
- hull-mounted sub-bottom profiler
- side scan sonar: dual frequency: 100/500 kHz
- multibeam echosounder: 200 to 450 kHz
- magnetometer

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- towed seabed video
- Shipek and VanVeen seabed sediment grab samplers
- acoustic corer, ROV-mounted sub-bottom imager and a wheeldrive cone penetrometer test.

High resolution multichannel seismic data will be acquired with a suite of a four-sleeve air source array (40 in<sup>3</sup> capacity each, 160 in<sup>3</sup> total capacity), a 96 channel streamer (6.25 m group and 12.5 m shot interval, 600 m/1,200 m active length), and an HTI NTRSII digital recording system. Data will be acquired to 2 seconds depth, sampled at 1 millisecond. The air source array will be deployed within a box frame, approximately 60 to 80 m off the stern of the vessel, and at a depth of 3 m. The compressed air is provided by an electric-powered (spared by diesel) compressor on deck. The maximum output from this array has a peak to peak value of 17.0 Bar-metres. This equates with decibel notation of 244.6 dB (peak to peak)//1uPa@1m, or 238 dB (zero to peak)//1uPa@1m. This is within the threshold previously assessed in Jacques Whitford (2009). Operating pressure of the air source array is a maximum of 2000 psi. The air source array can be ramped up in output prior to start of line.

One 1,200 m-long gel filled streamer will be towed from middle of the stern of the vessel (slightly offset to port). A tail buoy will be used, equipped with a radar reflector and strobe light, as well as a separate GPS tracking system. Total streamer length will be approximately 750 m/1,350 m.

A Hunttec DTS sub-bottom profiler will be deployed from the stern of the survey vessel, through an "A" Frame. The system will be towed within the water column between 30 and 50 m off the seabed. The system will be approximately 75 m behind the survey vessel (dependent on cable deployed, water depth and vessel speed). The Hunttec DTS uses a "broad band" boomer acoustic source, with frequency bandwidth from 500 Hz to 6 kHz. Power output is typically 500 Joules, but may be increased to 1 kJ if necessary. Maximum peak to peak amplitude is 221 dB relative to 1 microPa at 1 m. The system uses an internal and external hydrophone to record the return signal. Vertical resolution is approximately 10 cm, with penetration of 10 to 20 m in gravels, 40 m in sands, and 100 m in soft sediment.

Seabed imagery will be acquired with a digital, dual-frequency side scan sonar system. Data will be logged for on-board assessment. Georeferenced data will be used to create a digital side scan sonar mosaic for inclusion in survey reports. Output power of this system is extremely low, equivalent to an echosounder in magnitude.

A multibeam echosounder will be deployed. Power output levels are similar to a standard echosounder. The system operates at a frequency of 240 kHz. In the event that potential debris is identified by the side scan or multibeam systems, a proton magnetometer will be deployed. This system is towed behind the vessel, 5 to 10 m above the seabed, and emits a low-power electromagnetic field.



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#### **1.3 Consultation**

Consultations are conducted as activities arise and occur throughout the year as appropriate. HMDC engages and informs the fishing industry (fishers and processors) through the One Ocean forum. The overview of planned activities is provided early in the year to One Ocean and activity updates are provided during subsequent meetings during the year. The fishing industry is notified of VSP and well site surveys prior to them being conducted.

#### **1.4 Mitigations**

These activities, with the exception of the removal of cuttings from the EDC, were previously assessed under the Hibernia Drill Centres Construction and Operations Program Environmental Assessment (Jacques Whitford 2009). Mitigation measures proposed in the Hibernia Drill Centres Construction and Operations Program Environmental Assessment (Jacques Whitford 2009) to reduce the potential for adverse environmental effects remain unchanged.

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### 2.0 BIOLOGICAL ENVIRONMENT UPDATES

As noted in Section 1.0, in addition to updates to Section 2.1.3 of the Hibernia Drill Centres Construction and Operations Program Environmental Assessment (Jacques Whitford 2009), the commercial fisheries and species at risk information has been updated to reflect the most current information (as of March 24, 2014).

#### 2.1 Commercial Fisheries

Fisheries activities within the Study Area identified in Hibernia Drill Centres Construction and Operations Program, Hibernia Management and Development Company (HMDC) (Jacques Whitford 2009) are little changed since the environmental assessment report was accepted in 2009, or the environmental assessment updates submitted in 2011 and 2013. The key fishery for the Northwest Atlantic Fisheries Organization (NAFO) Unit area 3Lt remains snow crab. However, it should be noted that for 2014, there were no snow crab (Figure 2-1) and minimal northern shrimp (Figures 2-2) catches in the northern section of the Project Area. Fisheries activities within the Study Area were reported and graphically depicted for 2005 to 2007 in the original environmental assessment (Jacques Whitford 2009) and graphically depicted 2008 to 2011 in the 2011 update (Stantec 2011) and graphically depicted 2013 in the 2013 update (Stantec 2013).

DFO Ottawa Statistical Division has a policy that prohibits the wholesale release of fisheries data in order to maintain privacy of individuals that could potentially be identified through detailed microdata. Spatial data are released at an aggregated 1/10th degree cell level only. No absolute values of weight and value are provided; the actual weight and value of a catch within each box are provided as a range. Therefore, the figures for 2012 data for snow crab (Figure 2-1) and northern shrimp (Figures 2-2) illustrate an average of the weight percentage data provided by DFO. The percent for a specific cell has been summed and divided by the number of months that specific cell was fished (i.e., when the cell was fished, x% of species A was caught in the boundaries).

Validated commercial fisheries data for 2013 for NAFO Division 3L are not available at this time.

DFO will be conducting surveys in NAFO Division 3L from the *Research Vessels* (RVs) *Needler* and *Teleost* (G. Sheppard, pers. comm.). The RV *Teleost* will be conducting the Newfoundland and Labrador Spring AZMP from April 11 to 29, 2014 in NAFO Divisions 3P + 3KLMNO. The RV *Teleost* will also be conducting the Greenland halibut survey from April 30 to May 9, 2014, in NAFO 2J + 3KL and a capelin survey from May 10 to 27, 2014 in NAFO 3KL. The RV *Teleost* will be conducting a Newfoundland and Labrador Fall Survey from November 25 to December 6, 2014 in NAFO 3K + 3L Deep. DFO research vessel locations in 2013 are illustrated in Figure 2-3.

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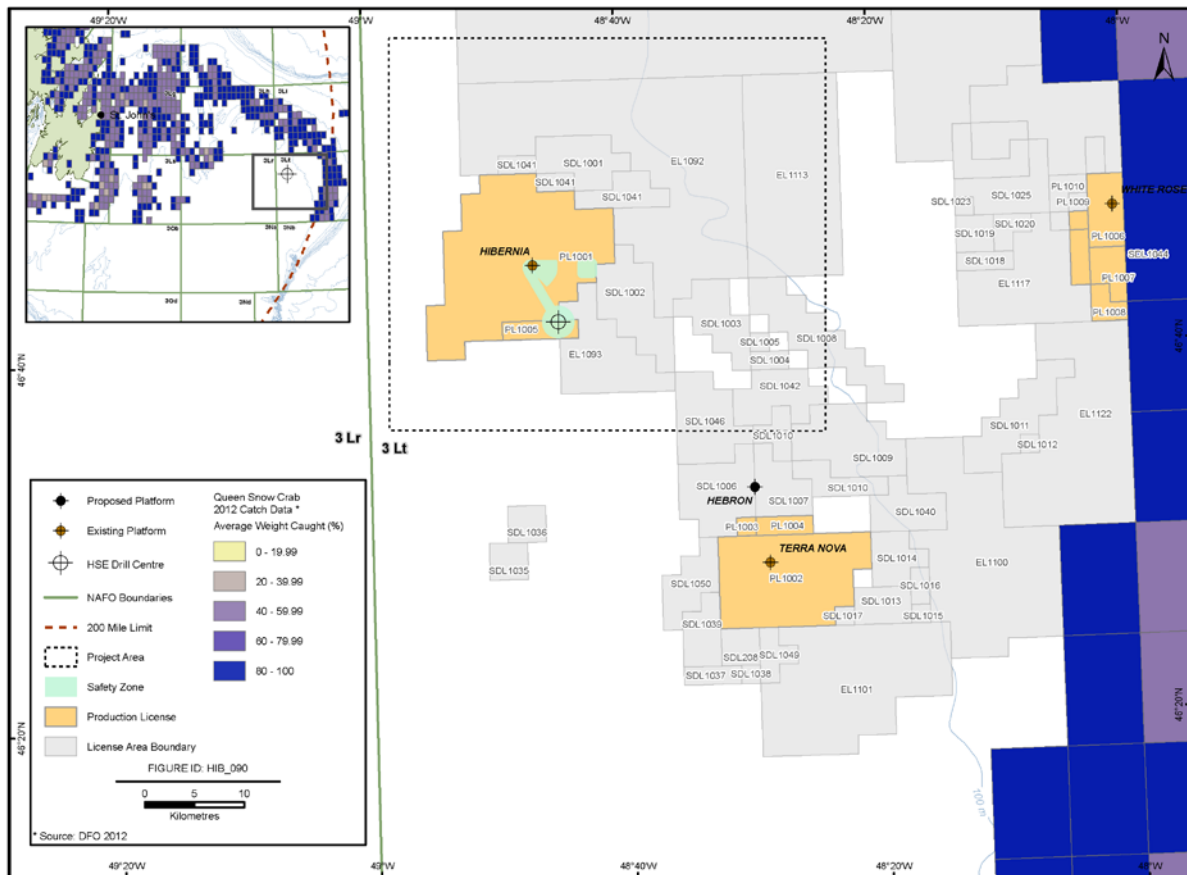


Figure 2-1 Snow Crab – Percent Average Weight Harvested (2012)

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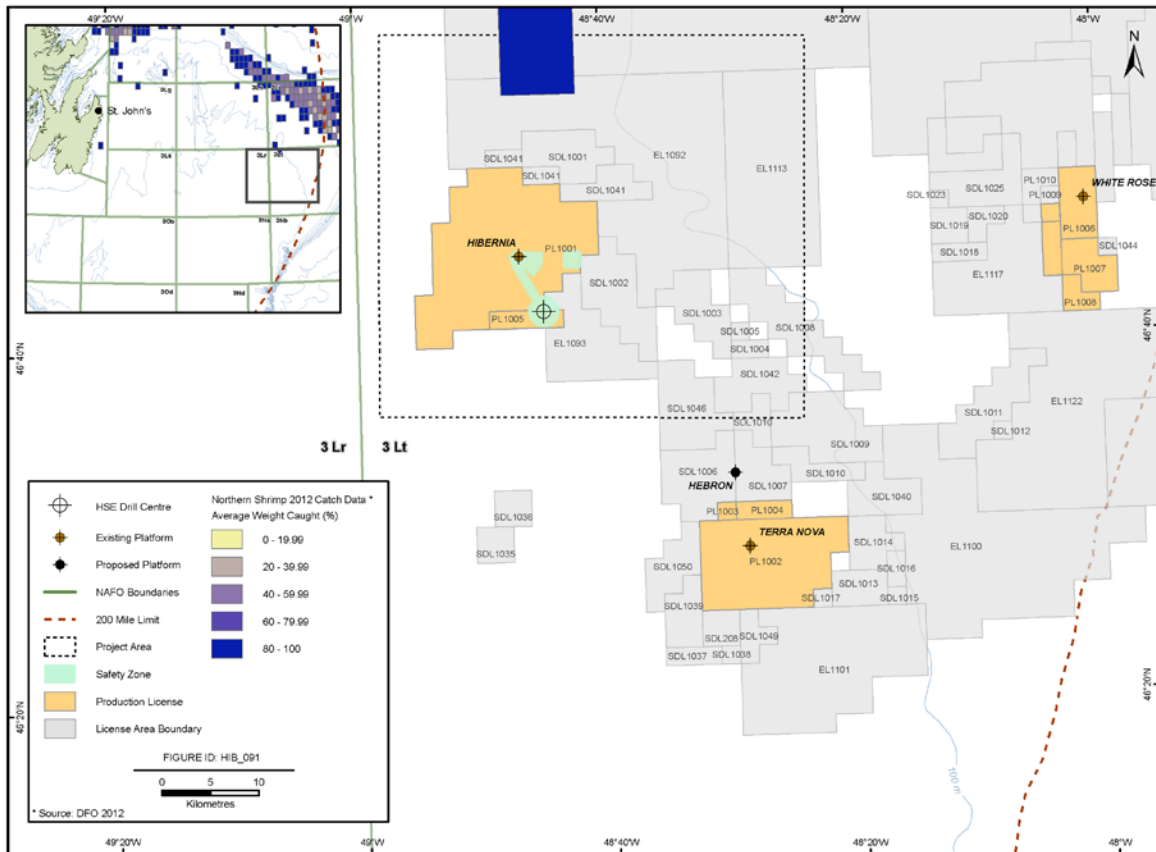
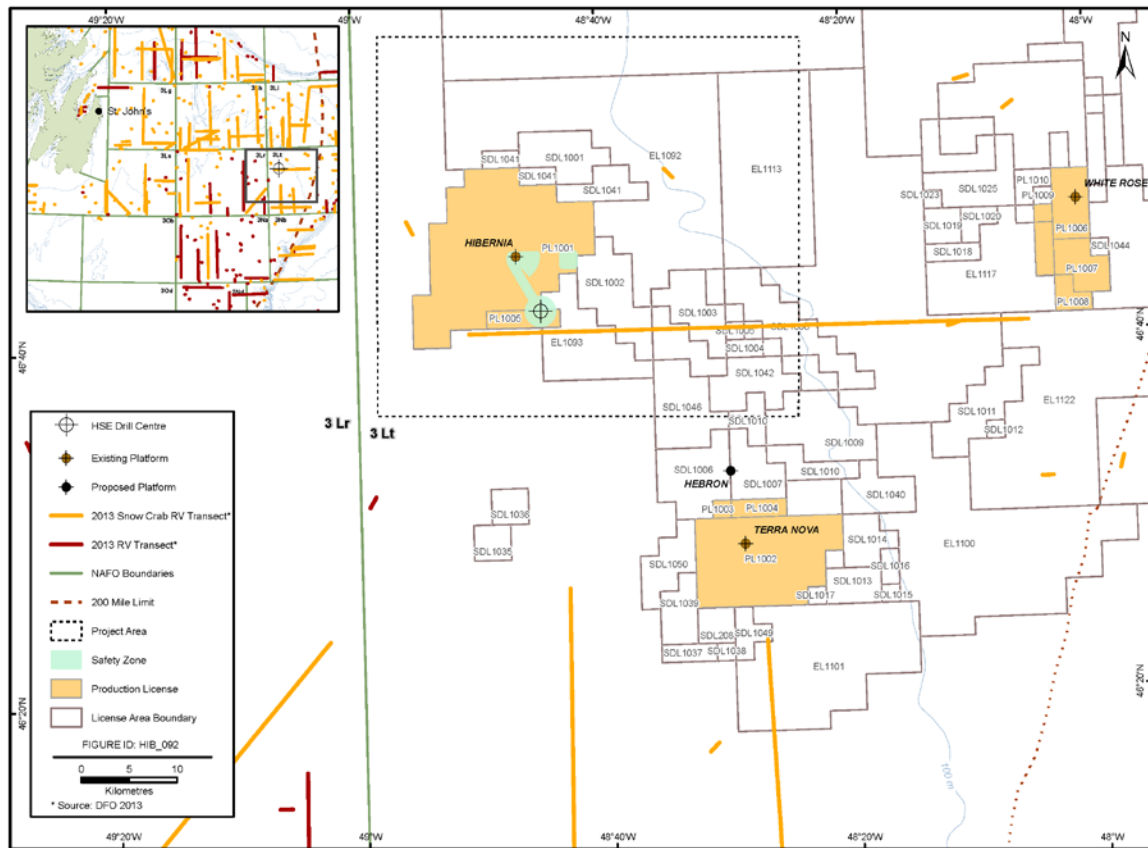


Figure 2-2 Northern Shrimp – Percent Average Weight Harvested (2012)

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**Figure 2-3 DFO Research Vessel Transects (2013)**

The RV *Needler* will be conducting the Newfoundland and Labrador spring survey from April 30 to May 14, 2014, in NAFO 3O + 3N, from May 15 to 27 in NAFO 3L + 3N and from May 28 to June 16, 2014, in NAFO 3L. The RV *Needler* will be conducting the Newfoundland and Labrador fall survey from October 1 to 14, 2014, in NAFO 3O + 3N, from October 15 to 28, 2014, in NAFO 3N + 3L, from October 29 to November 11, 2014, in NAFO 3L and from November 12 to 25, 2014, in NAFO 3K + 3L.

The 2012 post-season crab survey ran from August 29 to November 17. The 2013 post-season crab survey collected samples from the same locations as the 2012 survey and the locations and timelines for the 2014 survey will be exactly the same as they were last year (D. Power, pers. comm.).

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## 2.2 Species at Risk Updates

Since the submission of the environmental assessment for the Hibernia Drill Centres Construction and Operations Program (Jacques Whitford 2009) and the 2011 and 2013 updates (Stantec 2011, 2013), there has been one addition (white hake) to the list of species included under the *Species at Risk Act* (SARA) or assessed as at risk by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) (SARA 2012) (Table 2.1). None of the species previously described since the last update (Stantec 2013) have had a designation change:

**Table 2.1 Occurrence of Species at Risk within the Study Area**

SPECIES		SARA Status	COSEWIC Status	Occurrence in the Study Area
Common Name	Scientific Name			
Birds				
Ivory Gull	<i>Pagophila eburnea</i>	Schedule 1 – Special Concern	Endangered	May occur but area is not known to be critical habitat for the species
Marine Mammals				
Blue Whale	<i>Balenoptera musculus</i>	Schedule 1 - Endangered	Endangered	Occurs but area is not known to be critical habitat for the species
North Atlantic Right Whale	<i>Eubalaena glacialis</i>	Schedule 1 - Endangered	Endangered	Occurs but area is not known to be critical habitat for the species
Fin Whale	<i>Balenoptera physalus</i>	Schedule 1 – Special Concern	Special Concern	Occurs but area is not known to be critical habitat for the species
Sowerby's Beaked Whale	<i>Mesoplodon bidens</i>	Schedule 1 – Special Concern	Special Concern	May occur in small numbers but area is not known to be critical habitat for the species
Killer Whale	<i>Orcinus orca</i>	No Schedule – No Status	Special Concern	May occur in small numbers but area is not known to be critical habitat for the species
Harbour Porpoise	<i>Phocoena phocoena</i>	Schedule 2 – Threatened	Special Concern	Occurs but area is not known to be critical habitat for the species
Northern Bottlenose Whale (Davis Strait-Baffin Bay-Labrador Sea pop)	<i>Hyperoodon ampullatus</i>	No Schedule – No Status	Special Concern	May occur in small numbers but area is not known to be critical habitat for the species



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SPECIES		SARA Status	COSEWIC Status	Occurrence in the Study Area
Common Name	Scientific Name			
Fish				
Atlantic Cod (NL Pop)	<i>Gadus morhua</i>	No Schedule – No Status	Endangered	Occurs but area is not known to be critical habitat for the species
Atlantic Wolffish	<i>Anarhichas lupus</i>	Schedule 1 – Special Concern	Special Concern	Occurs but area is not known to be critical habitat for the species
American Plaice (NL Pop)	<i>Hippoglossoides platessoides</i>	No Schedule – No Status	Threatened	Occurs but area is not known to be critical habitat for the species
American Eel	<i>Anguilla rostrata</i>	No Schedule – No Status	Threatened	Occurs but area is not known to be critical habitat for the species
Blue Shark	<i>Prionace glauca</i>	No Schedule – No Status	Special Concern	Not likely to occur
Roughhead Grenadier	<i>Macrourus berglax</i>	No Schedule – No Status	Special Concern	Occurs but area is not known to be critical habitat for the species
Roundnose Grenadier	<i>Coryphaenoides rupestris</i>	No Schedule – No Status	Endangered	Occurs but area is not known to be critical habitat for the species
Basking Shark	<i>Cetorhinus maximus</i>	No Schedule – No Status	Special Concern	May occur in small numbers but area is not known to be critical habitat for the species
Northern Wolffish	<i>Anarhichas denticulatus</i>	Schedule 1 - Threatened	Threatened	Occurs but area is not known to be critical habitat for the species
Porbeagle Shark	<i>Lamna nasus</i>	No Schedule – No Status	Endangered	Occurs but area is not known to be critical habitat for the species
Shortfin Mako	<i>Isurus oxyrinchus</i>	No Schedule – No Status	Threatened	Not likely to occur
Spotted Wolffish	<i>Anarhichas minor</i>	Schedule 1 - Threatened	Threatened	Occurs but area is not known to be critical habitat for the species
Cusk	<i>Brosme brosme</i>	No Schedule – No Status	Endangered	Not likely to occur
White Shark	<i>Carcharodon carcharias</i>	Schedule 1 - Endangered	Endangered	Not likely to occur

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SPECIES		SARA Status	COSEWIC Status	Occurrence in the Study Area
Common Name	Scientific Name			
Deepwater Redfish (northern pop)	<i>Sebastes mentella</i>	No Schedule – No Status	Threatened	Occurs but area is not known to be critical habitat for the species
Acadian Redfish (Atlantic pop)	<i>Sebastes fasciatus</i>	No Schedule – No Status	Threatened	May occur in small numbers but area is not known to be critical habitat for the species
Atlantic Salmon (South NL pop)	<i>Salmo salar</i>	No Schedule – No Status	Threatened	Not likely to occur
Atlantic Bluefin Tuna	<i>Thunnus thynnus</i>	No Schedule – No Status	Endangered	May occur in small numbers but area is not known to be critical habitat for the species
Smooth Skate (Funk Island Deep, NL pop)	<i>Malacoraja senta</i>	No Schedule – No Status	Endangered	Occurs but area is not known to be critical habitat for the species
Thorny Skate	<i>Amblyraja radiata</i>	No Schedule – No Status	Special Concern	Occurs but area is not known to be critical habitat for the species
Spiny Dogfish	<i>Squalus acanthias</i>	No Schedule – No Status	Special Concern	Occurs but area is not known to be critical habitat for the species
<b>White Hake (Atlantic and Northern Gulf of St. Lawrence pop)</b>	<b><i>Urophycis tenuis</i></b>	<b>No Schedule – No Status</b>	<b>Threatened</b>	<b>Uncommon on the Grand Banks</b>
<b>Reptiles</b>				
Leatherback Turtle	<i>Dermochelys coriacea</i>	Schedule 1 – Endangered	Endangered	Occurs but area is not known to be critical habitat for the species
Loggerhead Sea Turtle	<i>Caretta caretta</i>	No Schedule – No Status	Endangered	Occurs but area is not known to be critical habitat for the species
Update to Table B.1 (Stantec 2013) Bolded species are new to the table				

White hake (*Urophycis tenuis*) was not previously described in either Jacques Whitford (2009) or Stantec (2011, 2013). As of November 2013, COSEWIC has assessed the white hake as threatened.

This species does not have status under SARA. Nor does it have final recovery strategies, action plans or associated critical habitat identified. None of the recovery or action plans that are

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available for the SARA species affect the mitigation measures committed to by HMDC in Hibernia Drill Centres Construction and Operations Program Environmental Assessment (Jacques Whitford 2009).

The following updates Section 4.5 of the Hibernia Drill Centres Construction and Operations Program Environmental Assessment (Jacques Whitford 2009) and the 2011 and 2013 Environmental Assessment Review updates (Stantec 2011, 2013), as white hake was not previously described in any of the cited reports.

### **White Hake**

White hake are a benthic species that is found in cold (5°C to 11°C), 200 to 1,000 m-deep water along the continental shelf and upper continental slope (Scott and Scott 1988). The prey of adult white hake is primarily other fish (including Atlantic herring, red, silver and longfin hake, Atlantic mackerel, cod and flatfish) and crustaceans, primarily shrimp (Scott and Scott 1988; Kulka and DeBlois (1996).

White hake may occur from southern Labrador to Cape Hatteras, but is most abundant in the Gulf of St. Lawrence, on the Scotian Shelf and in the Gulf of Maine. On the Grand Banks, white hake occur infrequently except in the warm waters along the southwest slope (Kulka et al. 2004). White hake have been identified in ichthyoplankton surveys on the northeast Grand Banks, during late summer and early fall (Dalley et al. 2000).

Over the past three generations, adults in Atlantic and Northern Gulf of St. Lawrence population have declined by an estimated 70 percent. The population has remained fairly stable since the mid-1990s (when most of the decline occurred due to fishing pressure) due to restrictions on fisheries over most of their range since the mid to late 1990s. Because their abundance has stabilized over the past generation, the Atlantic and Northern Gulf of St. Lawrence population of white hake were assessed by COSEWIC as Threatened, although they met the criteria for Endangered (COSEWIC 2011).

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Environmental Effects Assessment  
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### **3.0 ENVIRONMENTAL EFFECTS ASSESSMENT**

The environmental effects predictions and significance determinations cited in Jacques Whitford (2009) are valid for the planned 2014 project activities. The mitigations for the activities planned to be carried out under the scope assessed in the Hibernia Drill Centres Construction and Operations Program Environmental Assessment (Jacques Whitford 2009) are still appropriate and HMDC reaffirms its commitment to the mitigation measures cited in the assessment and the associated Screening Report (C-NLOPB 2009).

The drill cuttings will be dispersed along the north and south sides of the EDC, approximately 40 m from the edges of the EDC. The affected areas are within the 8,000 m<sup>2</sup> depositional area for the water-based mud cuttings and 5,000 m<sup>2</sup> for the synthetic-based mud cuttings assessed in the Hibernia Drill Centres Construction and Operations Program Environmental Assessment (Jacques Whitford 2009). Therefore, the residual environmental effect of dispersion of the removed cuttings from the EDC is assessed as not significant.

Further work will be undertaken at both the Hibernia Platform and the HSE EDC to better understand the extent of effects of drill cuttings deposition on fish habitat. A ROV video recording of the areas affected will be developed and will be included in a report. The ROV survey data will be reviewed after the first year and the survey approach will be adjusted as needed to ensure adequacy and effectiveness.

## 2014 ENVIRONMENTAL ASSESSMENT UPDATE

### HIBERNIA DRILL CENTRES CONSTRUCTION AND OPERATIONS PROGRAM (2014)

References  
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#### 4.0 REFERENCES

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